

CLAIMS

1. Device for investigating reactions between interactive species, said device comprising:

- one or more plasma deposited layers, which layers comprise one or more first pre-selected functional group species, which functional group species are interactive with a pre-selectable second species.

2. Device according to claim 1 wherein the plasma deposited layer is supported on a substrate.

3. Device according to claims 1 or 2 further comprising a film of a free electron metal, preferably selected from the group consisting essentially of copper, silver, aluminum and gold.

4. Device according to claim 3 wherein the plasma deposited layer is arranged directly on the free electron metal film.

5. Device according to any of the previous claims, wherein the plasma deposited layer, comprises one or more chemical and/or biological functional groups.

6. Device according to claim 5, further comprising one or more wet chemically deposited layer(s), arranged on the plasma deposited layer.

7. Device according to any of the preceding claims wherein the plasma layers comprise one or more amine compounds and/or one or more sulphur compounds, preferably thiols, sulfides and/or disulfides and most preferably being diallyl sulfide.

8. Device according to claim 7, wherein the substrate consists essentially of gold.

9. Process for providing a device according to any of the previous claims, comprising the step of depositing a gas plasma layer onto a pre-selected substrate in order to provide the substrate with a predetermined functionality.

10. Process according to claim 9 wherein the plasma layer is directly deposited onto the substrate and/or onto a metal film arranged on the substrate.

11. Process according to claims 9 or 10 wherein 5 plasma is deposited from a monomer/ oligomer/ polymer in gas form, preferably being a monomer, said monomer being saturated, partially saturated or unsaturated.

12. Process according to any of the claims 9-11 wherein the substrate is subjected to a pre-cleaning step 10 comprising pre-treating the substrate by means of a plasma etching step before the plasma deposition step said pre-cleaning step preferably comprising pre-treatment with air plasma.

13. Process according to any of the claims 9-12 15 wherein the gas plasma is deposited under the following conditions:

- a discharge power of upto 5000 W, preferably upto 500 W,

- an exposure duration of upto 1000 s,

20 preferably upto 100 s,

- a plasma gas flow of upto 10000 cm³/min, preferably upto 100 cm³/min,

- a pressure of upto 1 bar, preferably from between 0,001-50 mbar,

25 - a frequency covering DC, AC, RF, and the MW, preferably from between 2-60 Mhz.

14. Process according to claim 13 wherein the discharge power is pulsed to the plasma, the pulse discharges being separated by:

30 - upto 1000 s preferably upto 100 s.

15. Process according to claims 13 or 14

wherein the substrate is treated in an after-glow.

16. Process according to claims 14-15 wherein following pulse discharge, the substrate is after-treated 35 with a pre-selected gas, which gas optionally comprises the one or more functional groups which have been plasma deposited.

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17. Process for providing a device according to any of the preceding claims 9-16, suitable for investigating reactions between interactive bio/chemical species by means of surface plasmon resonance spectroscopy, said process comprising the steps of:

5 - preselecting a free electron metal substrate, which metal substrate is suitable for allowing investigation by surface plasmon resonance spectroscopy, arranging a preselected first functional group species on the free electron metal substrate by means of plasma deposition, which first functional group species protects the free electron metal substrate from a second functional group species whose interaction with the plasma deposited first functional group species can be 10 investigated, thereby preventing undesirable interactions between the free electron metal substrate and the second functional group species, and which first functional group species provides a desired functionality for the second functional group species, and

15 - subsequently arranging a second functional group species on the plasma deposited layer of the first functional group species, whereafter interaction between the first and second functional group species layers, can be investigated by means of surface plasmon resonance

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25 spectroscopy.

18. Process for providing a device according to any of the preceding claims 9-17, suitable for investigating reactions between interactive bio/chemical species by means of surface plasmon resonance spectroscopy, said process comprising the steps of:

30 - preselecting a free electron metal substrate, preferably being gold, which metal substrate is suitable for allowing investigation by surface plasmon resonance spectroscopy, arranging a preselected first functional group species on the free electron metal substrate by means of plasma deposition, which functional group species preferably is selected from a sulphur compound, which first functional group species protects the free

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electron metal substrate from a second functional group species whose interaction with the plasma deposited first functional group species can be investigated, thereby preventing undesirable interactions between the free electron metal substrate and the second functional group species, and which first functional group species provides a desired functionality for the second functional group species.

19. Process according to claim 17 or 18,
10 wherein before being exposed to the second functional group species, a bio/chemical functional layer is wet chemically arranged on the plasma deposited first functional group species layer, said wet chemically arranged functional layer being preselected for its 15 specificity for the second functional group species and for the prevention of non specific interactions with the said second functional group species.

20. Device according to claims 1 to 8,
obtainable according to a process according to any of the 20 claims 9-19.

21. Process for investigating the interaction, for example real time surface interaction, of pre-determined chemical and/or biological species, comprising the steps of analyzing the interaction between the 25 species arranged on a device according to any of the claims 1 to 8 and/or 20.

22. Use of a device according to any of the claims 1-8, and/or 20 for investigating the reaction between chemically interactive species, and especially 30- for use in SPR.

23. Use of a device for investigating reactions between interactive bio/chemical species, by means of surface plasmon resins spectroscopy, said device comprising a preselected free electron metal substrate, and a preselected, plasma deposited layer arranged on the 45 free electron metal substrate, which plasma deposited functional group species is chosen for its attachment ability to the free electron metal substrate, and for its

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~~specificity to further functional group species, whereby the interaction therebetween is investigatable by means of surface plasmon resonance spectroscopy.~~

~~24. Use of a device according to claim 23,
5 wherein the pre-selected free electron metal substrate
consists essentially of gold, and wherein the plasma
deposited layer comprises one or more sulphur compounds.~~

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